

# RT 390

## Test stand for control valves



The illustration shows a similar unit with accessory RT 390.01.

### Description

- **design and function of control valves**
- **determination of  $K_v$  and  $K_{vs}$  values**
- **GUNT software to plot valve characteristics and step responses**

Control valves are key components of process engineering systems. They act as an actuator and create a link between the controller and the system. Control valves are generally used for regulating flows of gases or liquids. Optimum control loop design depends on a sound knowledge of control valve behaviour as well as knowledge of the controlled system response.

The mobile test stand permits investigation and testing of different control valve models. A water circuit with a pump and tank is provided for this analysis. Connections permit integration of the valve under test into the water circuit. The flow rate is adjusted by a gate valve and recorded by an electromagnetic flow rate sensor. Two pressure sensors are used to measure the pressure upstream and downstream of the control valve.

The supply pressure for electro-pneumatic valves can be adjusted by a pressure regulator on the switch cabinet. The manipulating variable can be set on potentiometers as a current signal. The position feedback from the valve is also returned as a current signal. Motorised valves are actuated by way of pushbuttons. A resistance teletransmitter measures the valve stroke.

The GUNT software for data acquisition can be used to plot and evaluate valve characteristics and step responses on a PC in a user-friendly way.

### Learning objectives/experiments

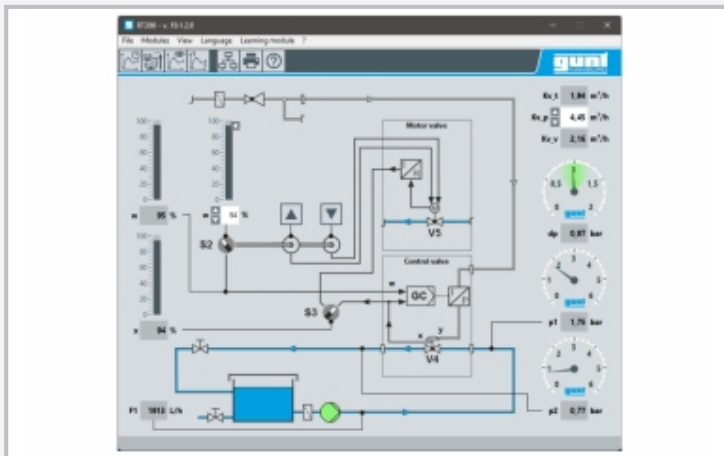
- together with control valves RT 390.01 – RT 390.06
  - ▶ demonstration and functional testing of control valves
  - ▶ determination of  $K_v$  and  $K_{vs}$  values
  - ▶ plotting valve characteristics
  - ▶ dynamic response of control valves: plotting step responses
  - ▶ influence of supply pressure on pneumatically operated valves
  - ▶ maintenance and adjustment

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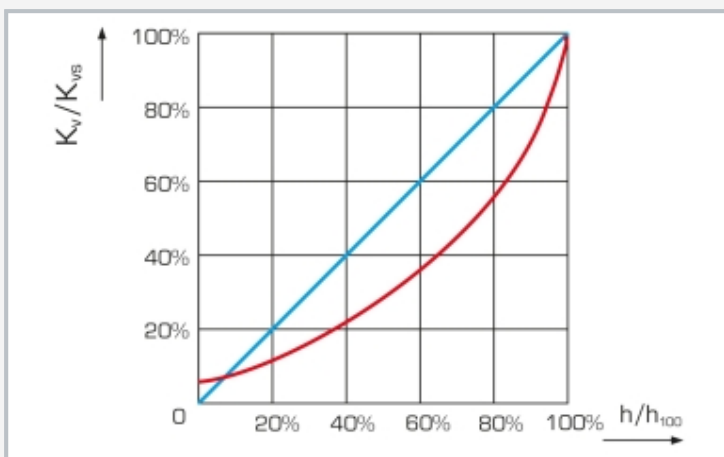
## Test stand for control valves



1 switch cabinet with controls, 2 flow rate sensor, 3 pressure reducing valve for air connection, 4 pump, 5 tank, 6 adjustment of flow rate, 7 pressure sensor, 8 outlet control valve, 9 inlet control valve



Software screenshot



Theoretical characteristics of a linear (blue) and equal-percentage (red) valve curve:  $K_v$ , flow coefficient,  $K_{vs}$  flow coefficient with valve fully open,  $h$  valve stroke

### Specification

- [1] investigation and testing of control valves
- [2] water circuit with tank, pump and connections for control valves
- [3] electromagnetic flow rate sensor
- [4] 2 pressure sensors to measure the pressure drop over the control valve
- [5] gate valve to adjust the flow rate
- [6] potentiometer to actuate electro-pneumatic valves with a current signal
- [7] pushbuttons to actuate motorised valves
- [8] manometer and pressure regulator to adjust the working pressure for electro-pneumatic valves
- [9] position feedback via current signal (electro-pneumatic valves) or resistance teletransmitter (motorised valves)
- [10] GUNT software for data acquisition via USB under Windows 10

### Technical data

Tank: approx. 90L

Two-stage centrifugal pump

- max. head: 22m
- max. flow rate: 5,4m<sup>3</sup>/h

Signals

- DC: 4...20mA
- resistance: 0...1000Ω

Auxiliary power

- AC: 24V
- air pressure for electro-pneumatic valves : 0...6bar

Measuring ranges

- flow rate: 0...4500L/h
- pressure:
  - ▶ 2x 0...6bar (water)
  - ▶ 1x 0...6bar (air)

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase

120V, 60Hz, 1 phase

UL/CSA optional

LxWxH: 1250x750x1430mm

Weight: approx. 190kg

### Required for operation

compressed air connection: min. 3bar  
PC with Windows recommended

### Scope of delivery

- 1 trainer
- 1 set of hoses
- 1 GUNT software + USB cable
- 1 set of instructional material

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### Optional accessories

#### Control valves

RT 390.01	Control valve, pneumatically driven, Kvs 2,5, equal-percentage
RT 390.02	Control valve, pneumatic, Kvs 1,0, equal-percentage
RT 390.03	Control valve, pneumatic, Kvs 2,5, linear
RT 390.04	Control valve, pneumatic, Kvs 1,0, linear
RT 390.05	Control valve, electrically driven, Kvs 2,5, equal-percentage
RT 390.06	Control valve, electric, Kvs 1,0, equal-percentage

#### for Remote Learning

GU 100	Web Access Box
with	
RT 390W	Web Access Software